

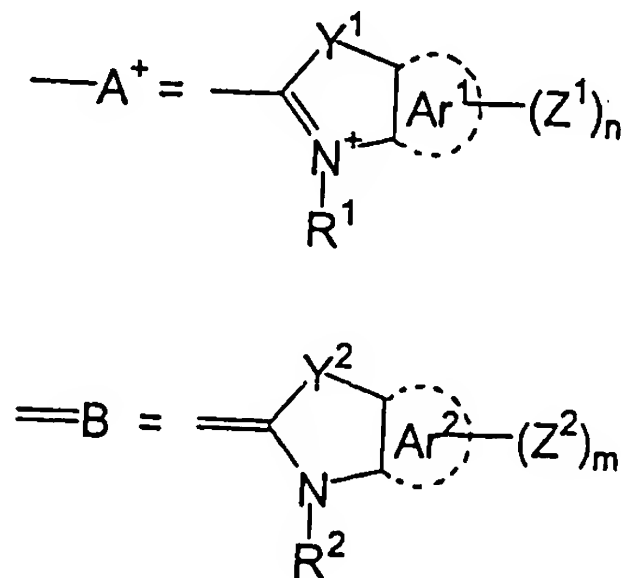
What is claimed is:

1. A negative image-recording material for heat-mode exposure systems, which comprises (A) an IR absorbent including cyanine dye having an electron-withdrawing group or a heavy atom-containing substituent in at least one terminal aromatic ring, (B) a radical generator and (C) a radically-polymerizable compound, wherein images are formed therein by imagewise exposure to IR rays.

2. A negative image-recording material for heat-mode exposure systems, which comprises (A') an IR absorbent of the following general formula (1), (B) a radical generator and (C) a radically-polymerizable compound, wherein images are formed therein by imagewise exposure to IR rays:



wherein



wherein A' and B are terminal groups represented by the formulae mentioned above;

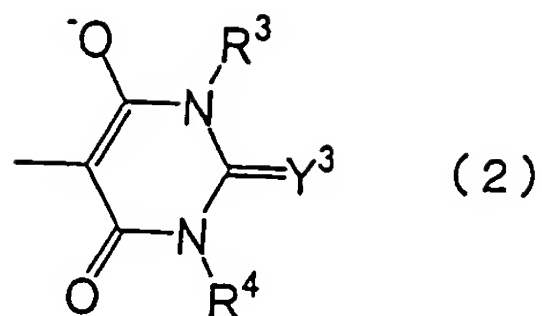
R^1 and R^2 each independently represent an optionally-substituted hydrocarbon group having at most 20 carbon atoms; Ar^1 and Ar^2 may be the same or different, each representing an optionally-substituted aromatic hydrocarbon group or heterocyclic group;

Y^1 and Y^2 may be the same or different, each representing a sulfur atom, an oxygen atom, a selenium atom, a dialkylmethylene group having at most 12 carbon atoms, or $-CH=CH-$;

Z^1 and Z^2 may be the same or different, each representing a substituent selected from a hydrocarbon group, an oxy group, an electron-withdrawing substituent and a heavy atom-containing substituent, and at least one of these is an electron-withdrawing group or a heavy atom-containing substituent;

n and m each independently indicate 0 or a positive integer, and the sum of n and m is at least 1;

Q represents a pentamethine group or a heptamethine group, optionally substituted by substituent(s) selected from an alkoxy group, an aryloxy group, an alkylthio group, an arylthio group, a dialkylamino group, a diarylamino group, a halogen atom, an alkyl group, an aralkyl group, a cycloalkyl group, an aryl group, an oxy group, an iminium base, and a substituent of the following general formula (2), and Q may have a cyclohexene, cyclopentene or cyclobutene ring containing continuous three methine chains:

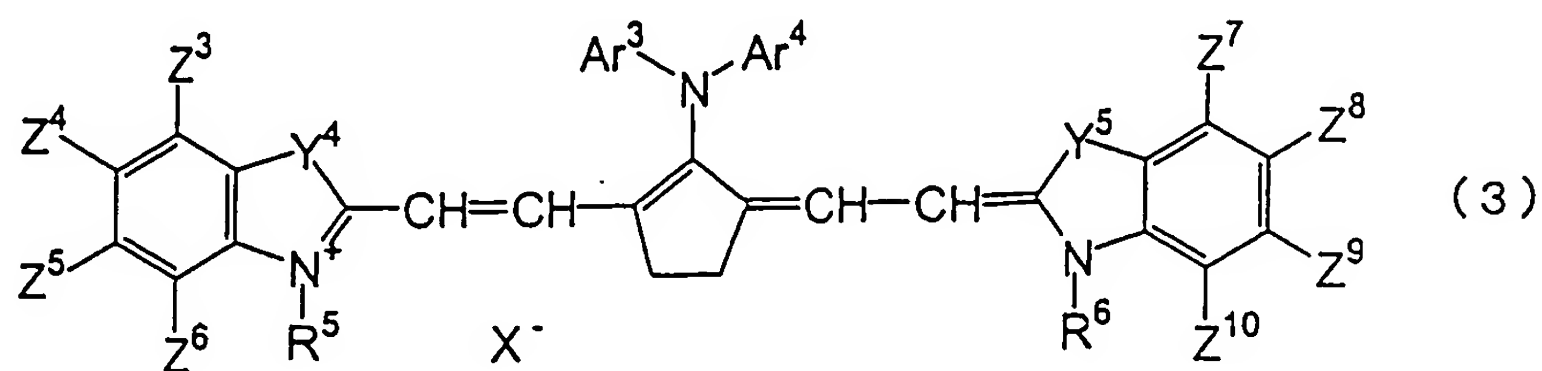


wherein R³ and R⁴ each independently represent a hydrogen atom, an alkyl group having from 1 to 8 carbon atoms, or an aryl group having from 6 to 10 carbon atoms;

Y³ represents an oxygen atom or a sulfur atom;

X⁻ represents a counter anion optionally existing for charge neutralization of the compound of formula (1).

3. A negative image-recording material for heat-mode exposure systems, which comprises (A'') an IR absorbent of the following general formula (3), (B) a radical generator and (C) a radically-polymerizable compound, wherein images are formed therein by imagewise exposure to IR rays:



wherein R⁵ and R⁶ each independently represent a linear or branched alkyl group having at most 20 carbon atoms, optionally substituted with any of an aryl group, an alkenyl group, an alkoxy group, a hydroxyl group, a sulfo group, a carboxyl group

and an acyloxy group;

Ar³ and Ar⁴ each independently represent a hydrogen atom, an alkyl group having from 1 to 4 carbon atoms, or an aryl group having from 6 to 10 carbon atoms, the alkyl group and the aryl group for these may be optionally substituted with any of an alkyl group, an aryl group and a halogen atom, and Ar³ and Ar⁴ may be bonded to each other;

Y⁴ and Y⁵ may be the same or different, each representing a sulfur atom, an oxygen atom, a selenium atom, a dialkylmethylene group having at most 12 carbon atoms, or -CH=CH-;

Z³ to Z¹⁰ may be the same or different, each representing a hydrogen atom, a hydrocarbon group, an oxy group, an electron-withdrawing group or a heavy atom-containing substituent, and at least one of these is an electron-withdrawing group or a heavy atom-containing substituent, and two neighboring groups of Z³ to Z¹⁰ may be bonded to each other to form a 5- or 6-membered ring;

X⁻ represents a counter anion optionally existing for charge neutralization of the compound of formula (1).

4. The negative image-recording material for heat-mode exposure systems as claimed in claim 2, wherein X⁻ is selected from a halide, a perchlorate, a tetrafluoroborate, a hexafluorophosphate and a sulfonate.

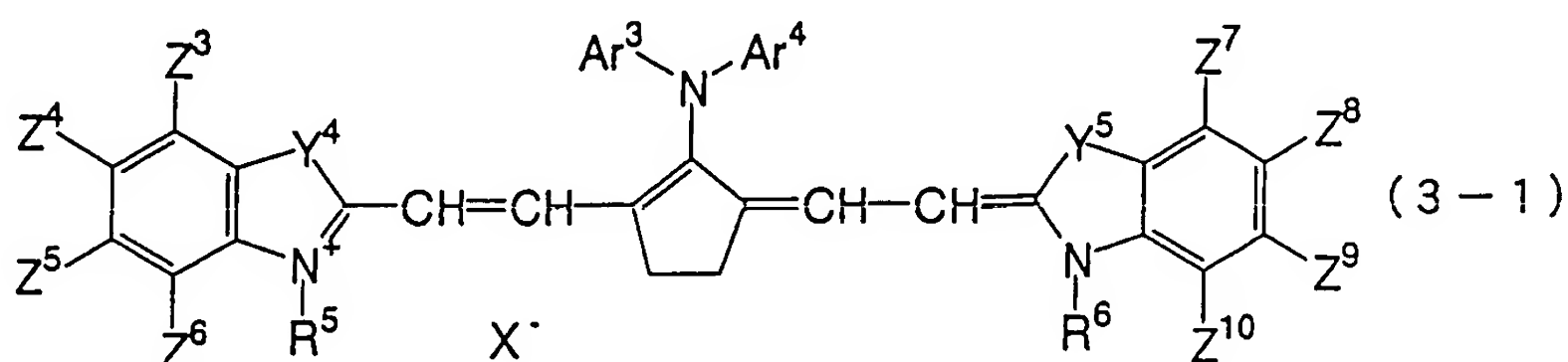
5. The negative image-recording material for heat-mode exposure systems as claimed in claim 2, wherein X⁻ is selected

form a perchlorate and a sulfonate.

6. The negative image-recording material for heat-mode exposure systems as claimed in claim 3, wherein X⁻ is selected from a halide, a perchlorate, a tetrafluoroborate, a hexafluorophosphate and a sulfonate.

7. The negative image-recording material for heat-mode exposure systems as claimed in claim 3, wherein X⁻ is selected from a perchlorate and a sulfonate.

8. A cyanine dye of the following general formula (3-1):



wherein R⁵ and R⁶ each independently represent a linear or branched alkyl group having at most 20 carbon atoms, optionally substituted with any of an aryl group, an alkenyl group, an alkoxy group, a hydroxyl group, a sulfo group, a carboxyl group and an acyloxy group;

Ar³ and Ar⁴ each independently represent a hydrogen atom, an alkyl group having from 1 to 4 carbon atoms, or an aryl group having from 6 to 10 carbon atoms, the alkyl group and the aryl group for these may be optionally substituted with any of an alkyl group, an aryl group and a halogen atom, and Ar³ and Ar⁴

may be bonded to each other;

Y^4 and Y^5 may be the same or different, each representing a sulfur atom, an oxygen atom, a selenium atom, a dialkylmethylene group having at most 12 carbon atoms, or $-CH=CH-$;

Z^3 to Z^{10} may be the same or different, each representing a hydrogen atom, a hydrocarbon group, an oxy group, an electron-withdrawing group or a heavy atom-containing substituent, and at least one of these is an electron-withdrawing group or a heavy atom-containing substituent, and two neighboring groups of Z^3 to Z^{10} may be bonded to each other to form a 5- or 6-membered ring;

X^- represents an ion of $CF_3SO_3^-$.

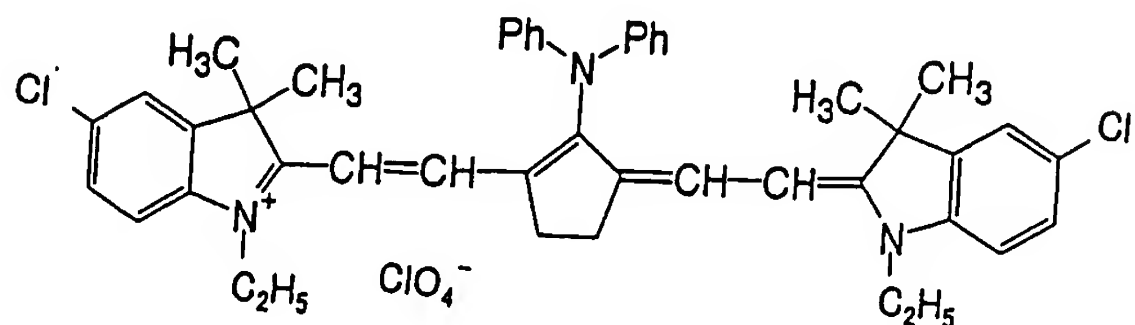
9. The negative image-recording material for heat-mode exposure systems as claimed in claim 1, wherein the electron-withdrawing group in the cyanine dye has a Hammett's substituent constant, σ_{para} , of at least 0.01.

10. The negative image-recording material for heat-mode exposure systems as claimed in claim 1, wherein the heavy atom in the heavy atom-containing substituent in the cyanine dye has an atomic weight of at least 28.

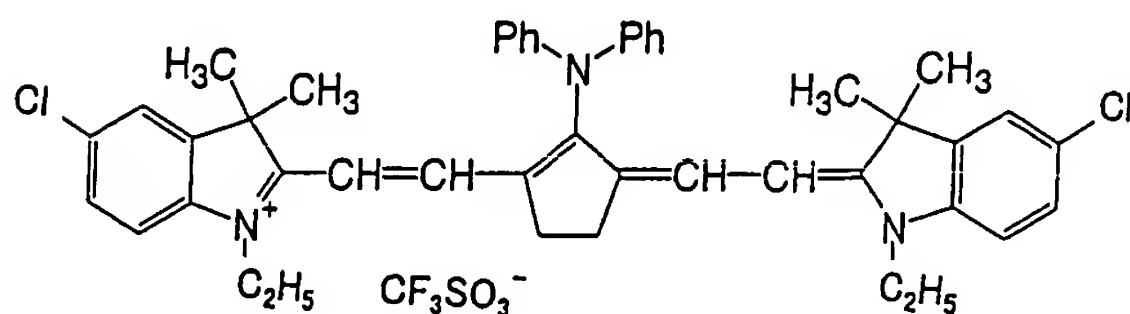
11. The negative image-recording material for heat-mode exposure systems as claimed in claim 10, wherein the heavy atom having an atomic weight of at least 28 is selected from silicon, phosphorus, sulfur, chlorine, germanium, arsenic, selenium, bromine, tin, antimony, tellurium and iodine.

12. The negative image-recording material for heat-mode exposure systems as claimed in claim 1, wherein the IR absorbent is selected from the following compounds:

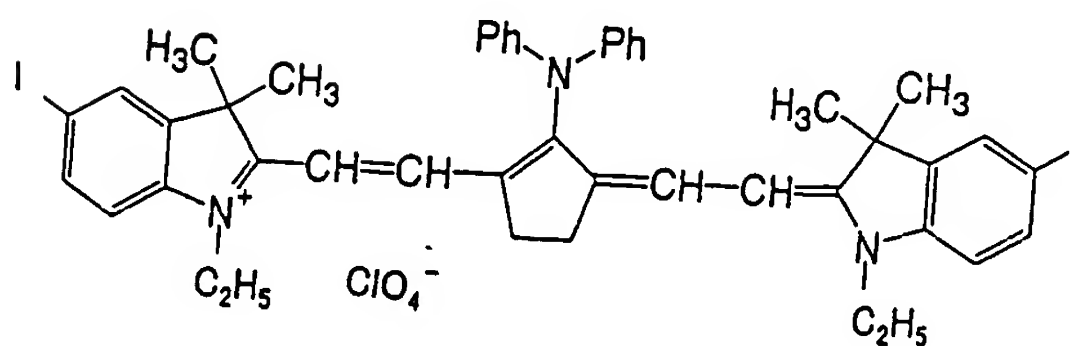
IR-1



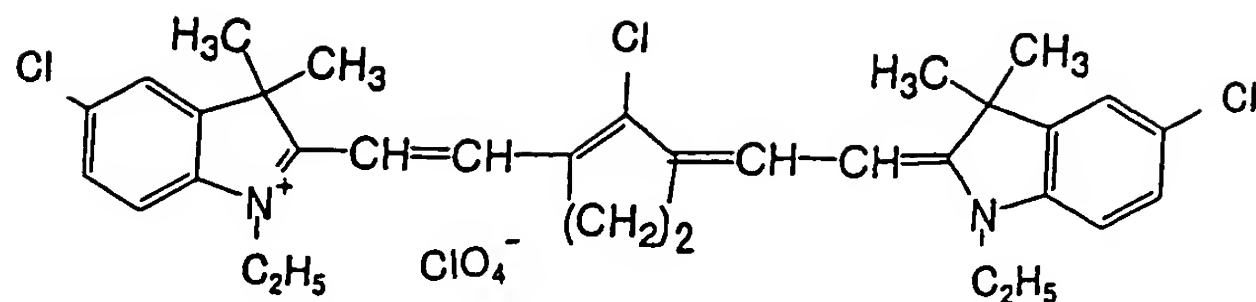
IR-2



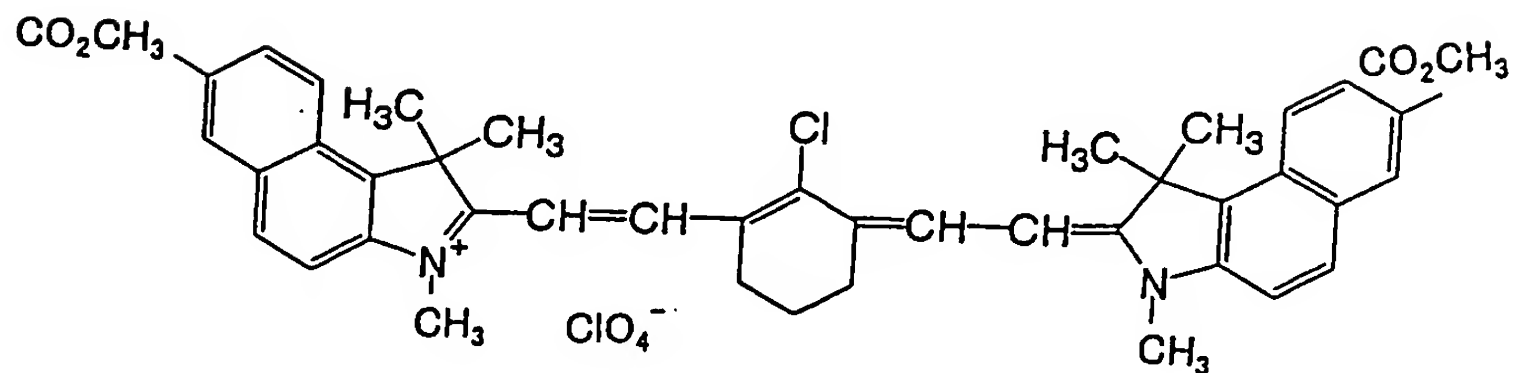
IR-5



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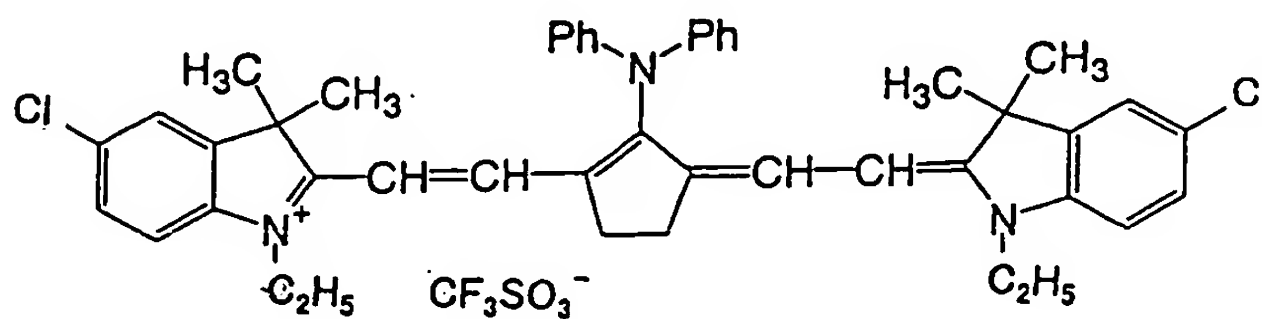


IR-22



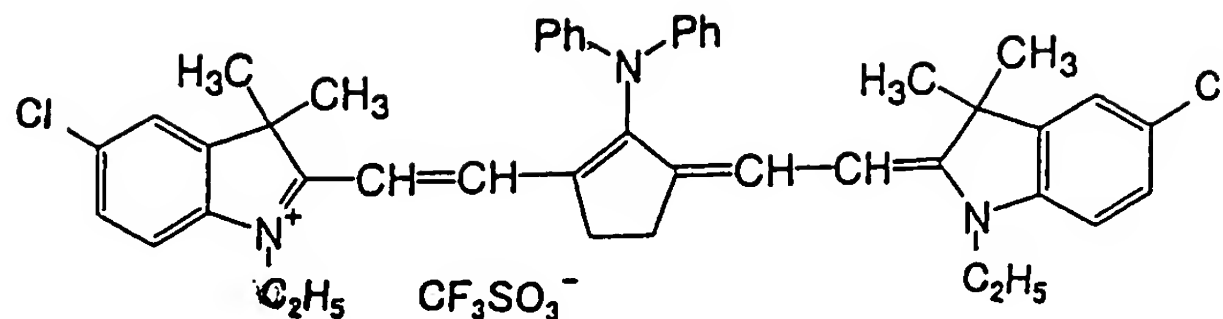
13. The negative image-recording material for heat-mode exposure systems as claimed in claim 2, wherein the IR absorbent is the following compound:

IR-2



14. The cyanine dye as claimed in claim 8, which is as follows:

IR-2



15. The negative image-recording material for heat-mode exposure systems as claimed in claim 1, wherein the radical generator is an onium salt.

16. The negative image-recording material for heat-mode exposure systems as claimed in claim 2, wherein the radical generator is an onium salt.

17. The negative image-recording material for heat-mode exposure systems as claimed in claim 15, wherein the onium salt is selected from a diazonium salt, an iodonium salt and a sulfonium salt.

18. The negative image-recording material for heat-mode exposure systems as claimed in claim 15, wherein the onium salt is a sulfonium salt.

19. The negative image-recording material for heat-mode exposure systems as claimed in claim 16, wherein the onium salt is selected from a diazonium salt, an iodonium salt and a sulfonium salt.

20. The negative image-recording material for heat-mode

exposure systems as claimed in claim 16, wherein the onium salt is a sulfonium salt.

21. The negative image-recording material for heat-mode exposure systems as claimed in claim 1, which has a resin interlayer between a recording layer comprising the IR absorbent, the radical generator and the radically-polymerizable compound, and the support.

22. The negative image-recording material for heat-mode exposure systems as claimed in claim 2, which has a resin interlayer between a recording layer comprising the IR absorbent, the radical generator and the radically-polymerizable compound, and the support.

23. The negative image-recording material for heat-mode exposure systems as claimed in claim 1, which further contains a colorant.

24. The negative image-recording material for heat-mode exposure systems as claimed in claim 2, which further contains a colorant.

25. The negative image-recording material for heat-mode exposure systems as claimed in claim 21, which has a protective layer.

26. The negative image-recording material for heat-mode exposure systems as claimed in claim 22, which has a protective layer.

27. The negative image-recording material for heat-mode

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exposure systems as claimed in claim 1, which further comprises a binder polymer.

28. The negative image-recording material for heat-mode exposure systems as claimed in claim 27, wherein the binder polymer is an alkali-soluble resins having a double bond in the side chain.

29. The negative image-recording material for heat-mode exposure systems as claimed in claim 1, which further comprises a binder polymer.

30. The negative image-recording material for heat-mode exposure systems as claimed in claim 29, wherein the binder polymer is an alkali-soluble resins having a double bond in the side chain.